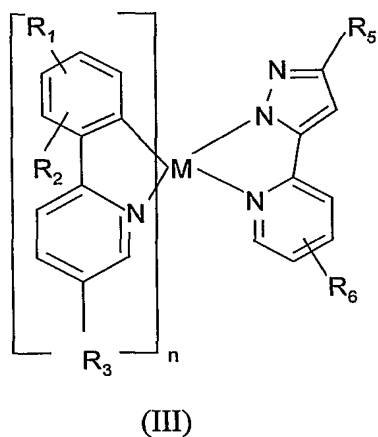
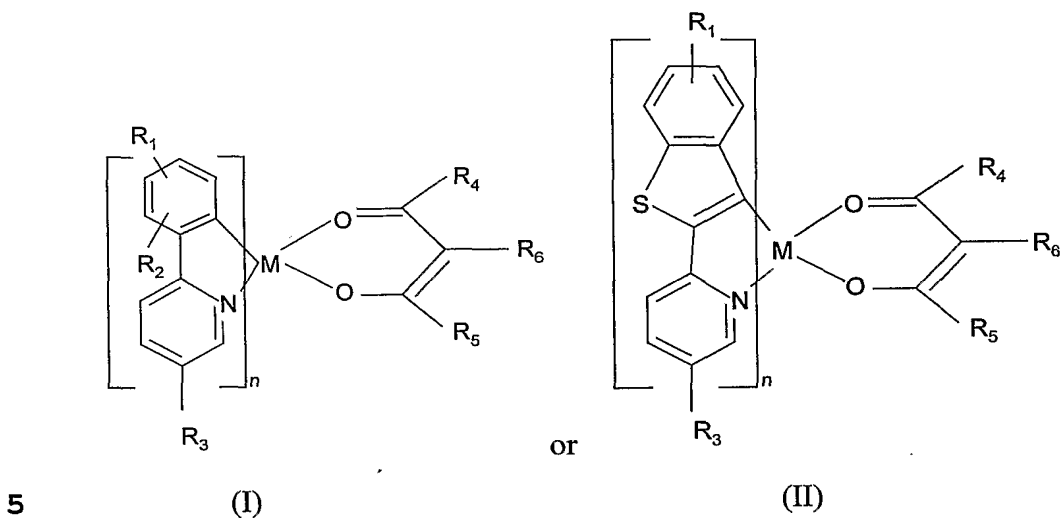


## Claims

### 1. Electroluminescent compounds of formula



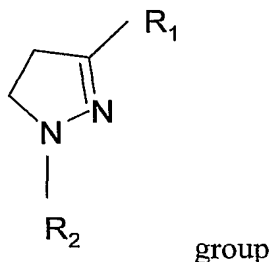
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where  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$ ,  $R_5$  and  $R_6$  can be the same or different and are selected from hydrogen, and substituted and unsubstituted hydrocarbyl groups such as substituted and unsubstituted aliphatic groups, substituted and unsubstituted aromatic, heterocyclic and polycyclic ring structures, fluorocarbons such as trifluoromethyl groups, halogens such as fluorine or thiophenyl groups;  $R_1$ ,  $R_2$  and  $R_3$  can also form

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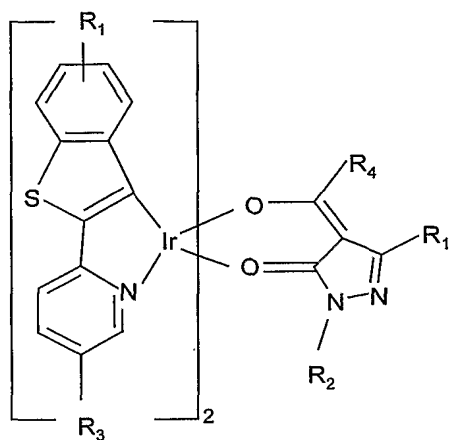
- substituted and unsubstituted fused aromatic, heterocyclic and polycyclic ring structures and can be copolymerisable with a monomer, e.g. styrene, and where  $R_4$  and  $R_5$  can be the same or different and are selected from hydrogen, and substituted and unsubstituted hydrocarbyl groups such as substituted and unsubstituted aliphatic groups, substituted and unsubstituted aromatic, heterocyclic and polycyclic ring structures, fluorocarbons such as trifluoromethyl groups, halogens such as fluorine or thiophenyl groups;  $R_1$ ,  $R_2$  and  $R_3$  can also form substituted and unsubstituted fused aromatic, heterocyclic and polycyclic ring structures and can be copolymerisable with a monomer,  $M$  is ruthenium, rhodium, palladium, osmium, iridium or platinum and  $n+2$  is the valency of  $M$ .

2. An electroluminescent compound as claimed in claim 1 in which  $M$  is iridium and  $n$  is 2.
3. An electroluminescent compound as claimed in claims 1 or 2 in which  $R_1$  and/or  $R_2$  and/or  $R_3$  and/or  $R_4$  and/or  $R_5$  and/or  $R_6$  include aliphatic, aromatic and heterocyclic alkoxy, aryloxy and carboxy groups, substituted and substituted phenyl, fluorophenyl, biphenyl, phenanthrene, anthracene, naphthyl and fluorene groups alkyl groups such as *t*-butyl, heterocyclic groups such as carbazole.
4. An electroluminescent compound as claimed in claims 1, 2 or 3 in which the compounds (I) are those in which  $R_5$  and  $R_6$  form a



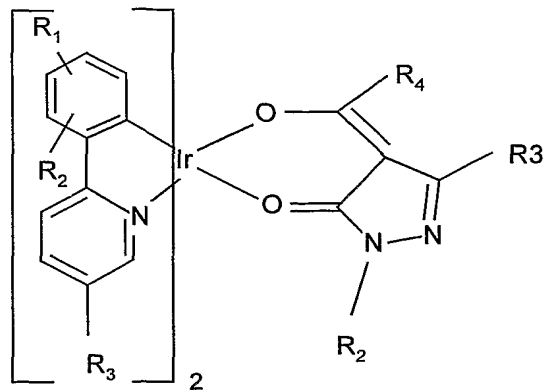
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5. An electroluminescent compound as claimed in claim 4 which has the formula



(IV)

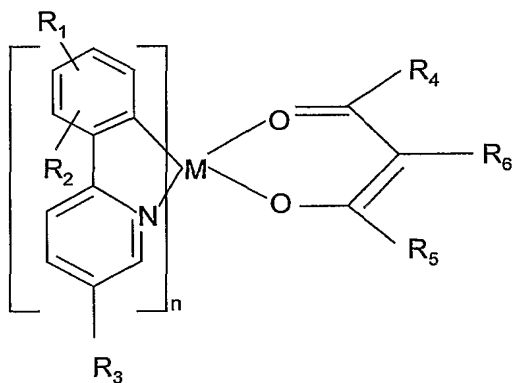
and



(V)

5 6. An electroluminescent compound as claimed in claim 5 in which R<sub>2</sub> is a phenyl or substituted phenyl group.

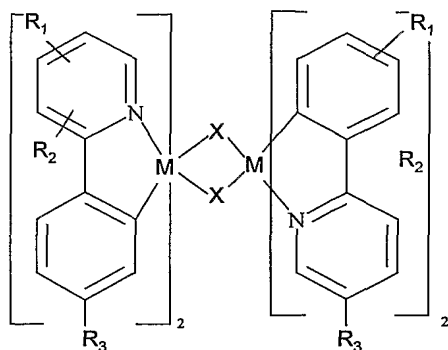
7. A method of making an electroluminescent compound of formula



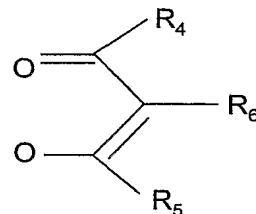
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which comprises reacting a compound of formula

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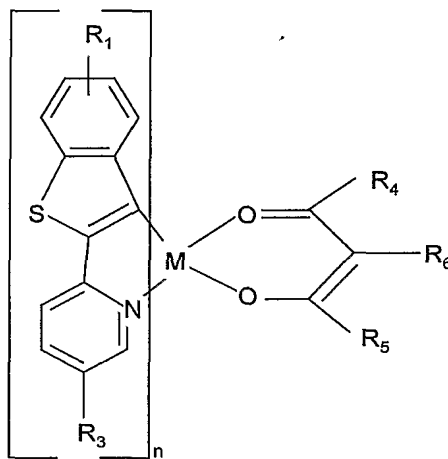


with a compound of formula

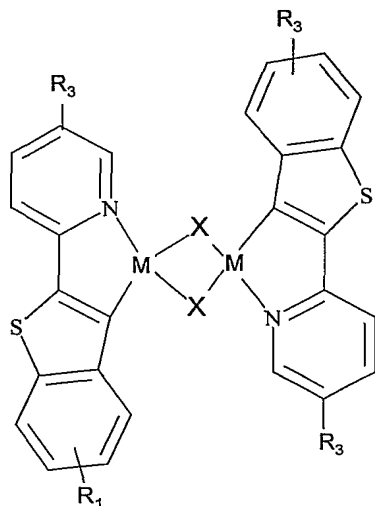


where  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$ ,  $R_5$  and  $R_6$  are as above,  $X$  is an anion and  $n+2$  is the valency of  $M$ .

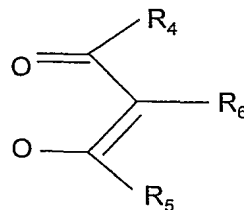
5 8. A method of making an electroluminescent compound of formula



which comprises reacting a compound of formula



with a compound of formula

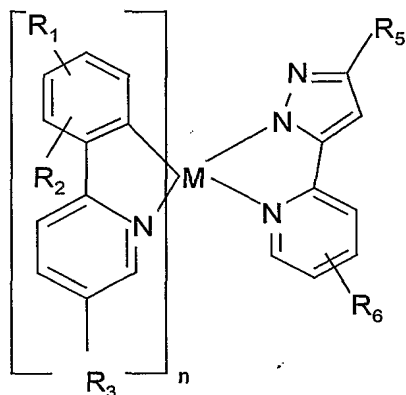


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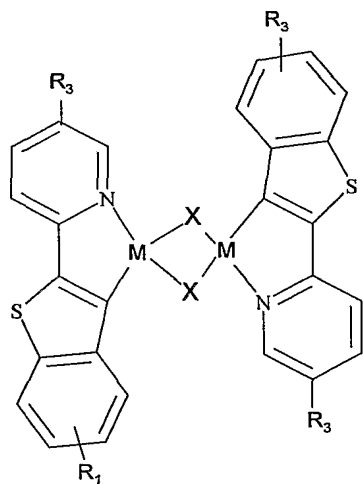
where  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$ ,  $R_5$  and  $R_6$  are as above,  $X$  is an anion and  $n+2$  is the valency of  $M$ .

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9. A method of making an electroluminescent compound of formula

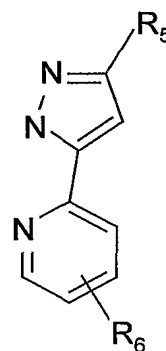


which comprises reacting a compound of formula



10

with a compound of formula



where  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$ ,  $R_5$  and  $R_6$  are as above,  $X$  is an anion and  $n+2$  is the valency of  $M$ .

10. An electroluminescent compound made by the method of any one of claims 7 to

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9.

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11. An electroluminescent device which comprises (i) a first electrode (ii) a layer of an electroluminescent material of formula as claimed in any one of claims 1 to 6 or claim 10 and (iii) a second electrode.
- 5 12. An electroluminescent device as claimed in claim 11 in which there is a layer of a hole transmitting material between the first electrode and the electroluminescent layer.
- 10 13. An electroluminescent device as claimed in claim 12 in which the hole transmitting material is an aromatic amine complex.
14. An electroluminescent device as claimed in claim 12 in which the hole transmitting material is a polyaromatic amine complex.
- 15 15. An electroluminescent device as claimed in claim 12 in which the hole transmitting material is a film of a polymer selected from poly(vinylcarbazole), N,N'-diphenyl-N,N'-bis (3-methylphenyl) -1,1' -biphenyl -4,4'-diamine (TPD), polyaniline, substituted polyanilines, polythiophenes, substituted polythiophenes, polysilanes and substituted polysilanes.
- 20 16. An electroluminescent device as claimed in claim 12 in which the hole transmitting material is a film of a compound of formula (VII) or (VII) herein or as in figures 4 to 8 of the drawings.
- 25 17. An electroluminescent device as claimed in claim 12 in which the hole transmitting material is a copolymer of aniline, a copolymer of aniline with o-anisidine, m-sulphanilic acid or o-aminophenol, or o-toluidine with o-aminophenol, o-ethylaniline, o-phenylene diamine or with an amino anthracene.

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18. An electroluminescent device as claimed in claim 12 in which the hole transmitting material is a conjugated polymer.

19. An electroluminescent device as claimed in claim 18 in which the conjugated polymer is selected from poly (p-phenylenevinylene)-PPV and copolymers including PPV, poly(2,5 dialkoxyphenylene vinylene), poly (2-methoxy-5-(2-methoxypentyloxy-1,4-phenylene vinylene), poly(2-methoxypentyloxy)-1,4-phenylenevinylene), poly(2-methoxy-5-(2-dodecyloxy-1,4-phenylenevinylene) and other poly(2,5 dialkoxyphenylenevinylenes) with at least one of the alkoxy groups being a long chain solubilising alkoxy group, poly fluorenes and oligofluorenes, polyphenylenes and oligophenylenes, polyanthracenes and oligo anthracenes, ploythiophenes and oligothiophenes.

20. An electroluminescent device as claimed in any one of claims 11 to 19 in which the electroluminescent compound is mixed with the hole transmitting material.

21. An electroluminescent device as claimed in any one of claims 11 to 20 in which there is a layer of an electron transmitting material between the cathode and the electroluminescent compound layer.

22. An electroluminescent device as claimed in claim 21 in which the electron transmitting material is a metal quinolate.

23. An electroluminescent device as claimed in claim 18 in which the metal quinolate is an aluminium quinolate, zirconium quinolate or lithium quinolate.

24. An electroluminescent device as claimed in claim 21 in which the electron transmitting material is of formula  $M_x(DBM)_n$  where  $M_x$  is a metal and DBM is dibenzoyl methane and  $n$  is the valency of  $M_x$ .

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25. An electroluminescent device as claimed in claim 21 in which the electron transmitting material is a cyano anthracene such as 9,10 dicyano anthracene, a polystyrene sulphonate or a compound of formulae shown in figures 2 or 3 of the drawings.

26. An electroluminescent device as claimed in any one of claims 21 to 25 in which the electron transmitting material is mixed with the electroluminescent compound.

27. An electroluminescent device as claimed in any one of claims 11 to 26 in which the first electrode is a transparent electricity conducting glass electrode.

28. An electroluminescent device as claimed in any one of claims 11 to 27 in which the second electrode is selected from aluminium, calcium, lithium, magnesium and alloys thereof and silver/magnesium alloys.